AP 2800

TRANSMITTAL OF APPEAL BRIEF (Large Entity)	Docket No. 1500

In re Application Of: **SCHMOLL, K., ET AL**

Serial No.	Filing Date	Examiner	Group Art Unit
09/763,254	04/05/2001	CUEVAS, P.	2834

Invention: **PIEZOELECTRIC ACTUATOR**

TO THE ASSISTANT COMMISSIONER FOR PATENTS:

Transmitted herewith in triplicate is the Appeal Brief in this application, with respect to the Notice of Appeal filed on **AUGUST 29, 2002**

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Dated: **OCTOBER 22, 2002**

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Signature of Person Mailing Correspondence

MICHAEL J. STRIKER

Typed or Printed Name of Person Mailing Correspondence

cc:

#15 Appeal Brief
D'ETAILS
11-4-02

UNITED STATES PATENT AND TRADEMARK OFFICE

Examiner: Pedro J. Cuevas *Art Unit:* 2834

In re:

Applicant: Klaus-Peter SCHMOLL

Serial No.: 09/763,254

Filed: April 5, 2001

BRIEF ON APPEAL

October 22, 2002

Hon. Commissioner of
Patents and Trademarks
Washington, D.C. 20231

Sir:

This is an appeal from the final rejection of claims 1-8 by the primary Examiner.

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Assistant Commissioner for Patents, Washington, D.C. 20231.
On 10/22/02

Real Party of Interest

The real party of interest in this application is Robert Bosch GmbH having a business address of Postfach 30 02 20, D-70442 Stuttgart, Germany.

Related Appeals and Interferences

There are no other appeals or interferences known to appellant, the appellant's legal representative, or assignee which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

Status of Claims

The present application contains claims 1-8.

All claims were rejected by the Examiner in the Final Office Action of May 2, 2002.

Status of Amendments

No Amendments were filed after the Final Office Action in the present application.

Summary of the Invention

Fig. 1 shows a piezoelectric actuator 1 which is comprised in an intrinsically known manner of piezoelectric foils 2 of a quartz material with a suitable crystalline structure so that that using the so-called piezoelectric effect, the application of an external electrical voltage to electrodes 3 and 4 via contact surfaces 5 and 6 cause a mechanical reaction of the piezoelectric actuator 1.

Fig. 2 depicts an enlarged region of the piezoelectric actuator 1 in which the electrodes 3 and 4 are shown, wherein the contacting of the electrodes 4 with the contact surface 6 is also shown here. Since the electrodes 3, due the different polarity, must be kept spaced apart from this contact surface 6, neutral phases are produced here which are shown by way of example in the form of the neutral phase 7. Due to the therefore spatially different occurrence of the piezoelectric effect, mechanicals tresses are produced in the neutral phase 7 causing damage to the material, which is schematically depicted with the wavy line 8.

Fig. 3 shows the region from Fig. 2, with the application of an electrical current, wherein the mechanical reaction of the piezoelectric actuator caused by this is indicated with arrows 9 and 10. It is clear here that

in the vicinity of the neutral phase 7, less of an expansion in the direction of the arrows 9 is produced and therefore an exertion of force is produced in the direction of the arrow 10, which leads to a fracture formation in the vicinity 8 of the neutral phase.

A first exemplary embodiment of the invention will be explained in conjunction with Fig. 4, in which an outer cover layer 11 is disposed on the multilayered structure and is provided with a thickening 12 in the vicinity of the neutral phases 7, which in the outer maximum can reach an order of magnitude of 2 to 8 µm. When the piezoelectric actuator 1 is clamped in place, this thickening 12 permits an initial stress to be exerted in the vicinity of the neutral phases 7, which prevents the fracture formation in the vicinity 8 of the electrodes 3 and 4 (see Fig. 3).

Fig. 5 shows a second exemplary embodiment which has an outer cover layer 11 with thickenings 13 which are disposed at opposite corners of the piezoelectric actuator 1. The neutral phases 7 here are likewise embodied at the corners since in this exemplary embodiment, the contacting of the electrodes 3 and 4 takes place via a contact surface 14 attached to the corner and a contact surface diagonally opposite from it, which is not shown.

In the exemplary embodiment according to Fig. 6, a thickening is produced in the vicinity of the neutral phases 7 by means of a local thickening of the electrodes 3 and 4 exclusively in the vicinity of the neutral phases 7.

Another exemplary embodiment according to Fig. 7 has a piezoelectric actuator 1 in which an insulating layer 15 that is extra-thick here is inserted between the piezoelectric layers 2 in the vicinity of the neutral phases 7 in order, when the piezoelectric actuator 1 is clamped in place, to exert an initial stress here as well, which prevents a fracture formation.

This is described essentially on pages 5 and 6 of the specification and shown in the drawings of Figures 1-7.

Issues

In the Final Office Action claims 1-4 and 6-8 were rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. patent to Hanafy in view of the U.S. patent to Issartel.

Thus, the first issue on appeal is whether the above listed claims are rejectable in the sense of 35 U.S.C. 103(a) over the above specified references.

Claim 5 is rejected under 35 U.S.C. 103(a) over the same references and further in view of common knowledge in the art. Thus, the second issue on appeal is whether claim 5 is rejectable under 35 U.S.C. 103(a) for the grounds presented by the Examiner.

Claim 5 is rejected as the above mentioned claims, and further in view of common knowledge in the art.

Grouping of Claims

Claim 1, the broadest independent claim currently on file, is separately patentable.

The other claims depend on claim 1, and they stand and fall together with claim 1.

Argument

In accordance with the present invention as defined in claim 1, the piezoelectric actuator has a multi-layered structure of piezoelectric layers 2 and electrodes 3, 4, disposed between them. An alternating lateral contacting 5, 6, of the electrodes 3, 4, is provided, a neutral phase 7 without any electrode layer is located in the region between the two piezoelectric layers which contains one of the electrodes 3, 4, and a shape of the multilayered structure is provided which permits an increased mechanical stress to be exerted in the vicinity of the neutral phase 7 when the piezoelectric actuator 7 is clamped in place perpendicular to the layer structure.

The actuator, as shown in Figure 1 at its one end under reference numeral 2 abuts against a flat surface which is stationary, and its another end surface identified with reference numerals 5 and 6 makes a movable part against a restoring force when the electrodes are correspondingly controlled. Actually the actuators of Figures 3-4 are clamped between two planes which are parallel to one another. One of the planes is stationary and the other might be adjusted. It is to be clear that when the end side for example in Figure 3 is leveled by the clamping force, against which the part to be moved is adjusted so that the end sides become plane as in Figure 1, then partially in the region 7 a higher pre-tensioning is

provided than in a conventional actuator. This is true analogously also for Figures 4-7.

The references applied by the Examiner show a transducer with a concave end side, which is not clamped by a force oriented perpendicularly to it and thereby also is not partially leveled or pre-tensioned, for producing different stress in the stacks.

The transducer disclosed in the U.S. patent to Hanafy is loaded from mall sides by the same force resulting from the atmospheric pressure. This does not provide any different stress in the piezo layers.

The transducer of the U.S. patent to Hanapy is also not an actuator whose action, such as for example control or actuation is applied. Instead, it is a transducer with a movable outer surface which produces no definite oriented force.

The transducer during its fast movements displaces air and fetches air by pressure formation and vacuum formation.

The Board's attention is respectfully directed to a part of claim 1 in which it is stated that by forming of the multilayer structure, an increased mechanical stress is able when the piezoelectric actuator is clamped perpendicular to the layered structure in the region of the neutral phase 7. In the prior art applied by the Examiner, namely the patent to Hanafy and the patent to Issartel, it can not be derived that on the transducer a mechanical stress which is increased relative to other locations is produced. Also no new neutral phase without an electrode layer between the piezo layers is available in the prior art. As can be seen from Figure 3 of the Hanafy patent, all electrode layers cover the whole surface of the different layers.

In view of the above presented remarks it is believed to be clear that the present invention as defined in claim 1 that claim 1 defines the features which are not disclosed in the references and can not be derived from them. In order to arrive at the applicant's invention from the teachings of the references, the references have to be fundamentally modified by actually redesigning them and introducing them the new features of the present invention which are defined now in claim 1. However, it is known that in order to arrive at a claimed invention, by modifying the references the cited art must itself contain a suggestion for such a modification.

This principle has also been consistently upheld by the U.S. Court of Customs and Patent Appeals which, for example, held in its decision in re Randol and Redford (165 USPQ 586) that

> Prior patents are references only for what they clearly disclose or suggestion; it is not a proper use of a patent as a reference to modify its structure to one which prior art references do not suggest.

Definitely, the references do not contain any hint or suggestion for such modifications.

The actuator defined in claim 1 accomplishes the results which can not be accomplished by the constructions disclosed in the references. It is well known that in order to support a valid rejection the art must also suggest that it would accomplish applicant's results. This was stated by the Patent Office Board of Appeals, in the case Ex parte Tanaka, Marushima and Takahashi (174 USPQ 38), as follows:

> Claims are not rejected on the ground that it would be obvious to one of ordinary skill in the art to rewire prior art devices in order to accomplish applicants' result, since there is no suggestion in prior art that such a result could be accomplished by so modifying prior art devices.

It is therefore believed that claim 1 should be considered as patentably distinguishing over the art and should be allowed and this is how the first issue under appeal should be resolved.

As for the second issue on appeal, with respect to claim 5, claim 5 stands and falls together with claim 1, and therefore its discussion should be considered superfluous.

It is therefore respectfully requested to reverse the Examiner's rejection of the claims and to allow the present application.

Respectfully submitted,

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CLAIMS

1. A piezoelectric actuator with

- a multilayered structure of piezoelectric layers (2) and electrodes (3, 4) disposed between them,
- an alternating lateral contacting (5, 6) of the electrodes (3, 4), wherein in the region between the two piezoelectric layers, which contains one of the electrodes (3, 4) that are respectively contacted on opposite sides from one another, there is a neutral phase (7) without an electrode layer, and
- a shape of the multilayered structure which permits an increased mechanical stress to be exerted in the vicinity of the neutral phases (7) when the piezoelectric actuator (1) is clamped in place perpendicular to the layer structure.

2. The piezoelectric actuator according to claim 1, characterized in that

- at least one outer cover layer (11) of the multilayered structure on the outer end face is embodied so that it has a thickening (12; 13) in the vicinity of the neutral phases (7).

3. The piezoelectric actuator according to claim 2, characterized in that

- the thickening (12) is disposed on opposite sides of the cover layer (11), in accordance with the placement of the neutral phases (7).

4. The piezoelectric actuator according to claim 2, characterized in that

- the thickening (13) is disposed at diagonally opposite corners of the cover layer (11), in accordance with the placement of the neutral phases (7).

5. The piezoelectric actuator according to one of claims 2 to 4, characterized in that

- the thickening is produced by grinding the cover layer.

6. The piezoelectric actuator according to claim 1, characterized in that

- an insulating layer (15) is disposed between (some or all?) Of the layers of the multilayered structure and has a thickening in the vicinity of the respective neutral phases (7).

7. The piezoelectric actuator according to claim 1, characterized in that

- the electrodes (3, 4) of the multilayered structure each have a thickening in the vicinity of the respective neutral phases (7).

8. The piezoelectric actuator according to one of claims 2 to 7, characterized in that

- some or all of the features of these claims are combined with one another.